

It is claimed:

1        1. A method of recording a digital signal and an analog signal, comprising:  
2            sampling said analog signal to form a first set of discrete analog samples;  
3            storing said first set of discrete analog samples into a first set of respective cells of a  
4        memory array;  
5            converting said digital signal into a continuous-time analog signal;  
6            sampling said continuous-time analog signal to form a second set of discrete analog  
7        samples; and  
8            storing said second set of discrete analog samples into a second set of respective cells  
9        of said memory array.

1        2. The method of claim 1, wherein converting said digital signal into a  
2        continuous-time analog signal comprises:  
3            generating a pulse-width modulated signal whose duty cycle depends on respective  
4        sample levels of said digital signal; and  
5            filtering said pulse-width modulated signal to form said continuous-time analog  
6        signal.

1        3. The method of claim 2, wherein converting said digital signal into a  
2        continuous-time analog signal further comprises reducing a sampling resolution of said digital  
3        signal prior to generating said pulse-width modulated signal.

1        4. The method of claim 1, further comprising decompressing said digital signal  
2        prior to converting said digital signal into a continuous-time analog signal.

1        5. A method of generating a digital signal and an analog signal, comprising:  
2            retrieving a first set of discrete analog samples from a memory array;  
3            filtering said first set of discrete analog samples to generate said analog signal;  
4            retrieving a second set of discrete analog samples from said memory array;  
5            filtering said second set of discrete analog samples to generate a continuous-time  
6        analog signal; and  
7            converting said continuous-time analog signal into said digital signal.

1           6.     The method of claim 5, wherein converting said continuous-time analog  
2 signal into said digital signal comprises:  
3           generating discrete samples of said continuous-time analog signal; and  
4           generating a pulse-width modulated signal whose duty cycle respectively depends on  
5 the amplitude of said discrete samples of said continuous-time analog signal; and  
6 digitizing the pulse-width modulated signal.

1           7.     The method of claim 6, wherein generating discrete samples of said  
2 continuous-time analog signal comprises generating said discrete samples that comprises an  
3 average voltage of said continuous-time analog signal between respective samples.

1           8.     The method of claim 5, further comprising increasing a sampling resolution  
2 of said digital signal.

1           9.     The method of claim 5, further comprising compressing said digital signal.

1           10.    A method of recording a digital signal, comprising:  
2           converting said digital signal into a continuous-time analog signal;  
3           sampling said continuous-time analog signal to form a plurality of discrete analog  
4 samples; and  
5           storing said plurality of discrete analog samples into respective cells of a memory  
6 array.

1           11.    The method of claim 10, wherein converting said digital signal into a  
2 continuous-time analog signal comprises:  
3           generating a pulse-width modulated signal whose duty cycle depends on respective  
4 sample levels of said digital signal; and  
5           filtering said pulse-width modulated signal to form said continuous-time analog  
6 signal.

1           12.    The method of claim 11, wherein converting said digital signal into a  
2 continuous-time analog signal further comprises reducing a sampling resolution of said digital  
3 signal prior to generating said pulse-width modulated signal.

1           13.     The method of claim 11, further comprising decompressing said digital signal  
2     prior to converting said digital signal into a continuous-time analog signal.

1           14.     A method of generating a digital signal, comprising:  
2         retrieving a plurality of discrete analog samples from a memory array;  
3         generating a continuous-time analog signal from said plurality of said discrete analog  
4     samples; and  
5         converting said continuous-time analog signal into said digital signal.

1           15.     The method of claim 14, wherein converting said continuous-time analog  
2     signal into said digital signal comprises:  
3         generating discrete samples of said continuous-time analog signal; and  
4         generating a pulse-width modulated signal whose duty cycle respectively depends on  
5     the amplitude of said discrete samples of said continuous-time analog signal.

1           16.     The method of claim 15, wherein generating discrete samples of said  
2     continuous-time analog signal comprises generating said discrete samples that comprises an  
3     average voltage of said continuous-time analog signal between respective samples.

1           17.     The method of claim 14, further comprising increasing a sampling resolution  
2     of said digital signal.

1           18.     The method of claim 14, further comprising compressing said digital signal.

1           19.     An analog/digital recording system, comprising:  
2         a memory array;  
3         a converter to convert a digital signal into a continuous-time analog signal; and  
4         a programming device to generate a first set of discrete analog samples of said  
5     continuous-time analog signal and to store said first set of discrete analog samples into said  
6     memory array, and to generate a second set of discrete analog samples from an input analog  
7     signal and to store said second set of discrete analog samples into said memory array.

1           20. The analog/digital recording system of claim 19, wherein said converter  
2 comprises:

3           a digital demodulator to generate a pulse-width modulated signal whose duty cycle  
4 depends on respective sample levels of said digital signal; and  
5           a filter to filter said pulse-width modulated signal to form said continuous-time  
6 analog signal.

1           21. The analog/digital recording system of claim 20, wherein said converter  
2 further comprises a digital smoothing interpolation filter to reduce a sampling resolution of  
3 said digital signal.

1           22. The analog/digital recording system of claim 19, further comprising an  
2 expander to decompress said digital signal prior to converting said digital signal into a  
3 continuous-time analog signal.

1           23. An analog/digital playback system, comprising:  
2           a memory array to store first and second sets of analog samples;  
3           a reading device to retrieve said first and second sets of analog samples and to  
4 generate first and second continuous-time analog signals respectively from said first and  
5 second sets of analog samples; and  
6           a converter to convert said first continuous-time analog signal into a digital signal.

1           24. The analog/digital playback system of claim 23, wherein said converter  
2 comprises:

3           a switch capacitor amplifier to generate discrete samples of said continuous-time  
4 analog signal; and  
5           an analog modulator to generate a pulse-width modulated signal whose duty cycle  
6 depends on the amplitude of respective discrete samples of said continuous-time analog  
7 signal.

1           25. The analog/digital playback system of claim 24, further comprising a digital  
2 anti-aliasing decimation filter to increase a sampling resolution of said digital signal.

1           26. The analog/digital playback system of claim 23, further comprising a  
2 compressor to compress said digital signal.

1           27. A digital recording system, comprising:  
2           a memory array;  
3           a converter to convert a digital signal into a continuous-time analog signal; and  
4           a programming device to generate discrete analog samples of said continuous-time  
5           analog signal and to store said discrete analog samples into said memory array.

1           28. The analog/digital recording system of claim 27, wherein said converter  
2 comprises:  
3           a digital demodulator to generate a pulse-width modulated signal whose duty cycle  
4 depends on respective sample levels of said digital signal; and  
5           a filter to filter said pulse-width modulated signal to form said continuous-time  
6           analog signal.

1           29. The analog/digital recording system of claim 28, wherein said converter  
2 further comprises a digital smoothing interpolation filter to reduce a sampling resolution of  
3 said digital signal.

1           30. The analog/digital recording system of claim 27, further comprising an  
2 expander to decompress said digital signal prior to converting said digital signal into a  
3 continuous-time analog signal.

1           31. A digital playback system, comprising:  
2           a memory array to store a plurality of analog samples;  
3           a reading device to retrieve said plurality of analog samples and to generate a  
4           continuous-time analog signal from said plurality of analog samples; and  
5           a converter to convert said continuous-time analog signal into a digital signal.

1           32. The analog/digital playback system of claim 31, wherein said converter  
2 comprises:  
3           a switch capacitor amplifier to generate discrete samples of said continuous-time  
4           analog signal; and

5           an analog modulator to generate a pulse-width modulated signal whose duty cycle  
6 depends on the amplitude of respective discrete samples of said continuous-time analog  
7 signal.

1           33.     The analog/digital playback system of claim 31, further comprising a digital  
2 anti-aliasing decimation filter to increase a sampling resolution of said digital signal.

1           34.     The analog/digital playback system of claim 31, further comprising a  
2 compressor to compress said digital signal.